

Illinois Environmental Protection
Agency

Technical Memorandum
Southeast Rockford Groundwater Contamination
Superfund Site
Source Area 4 Pre-Design Field Study

Text, Tables, and Figures

March 31, 2006

*Technical
Memorandum*



Memorandum

To: Mr. Thomas Williams, Illinois EPA

From: Mr. John Grabs

Date: March 31, 2006

*Subject: Southeast Rockford Groundwater Contamination Superfund Site
Source Area 4 Phase II Field Study Technical Memorandum*

This memorandum was prepared at the request of the Illinois Environmental Protection Agency (Illinois EPA) project manager (PM) to describe the field work activities and the contamination encountered during the phase II pre-design field studies performed at Source Area 4 (Area 4) from August 2005 through December 2005. Area 4 is located at 2630 Marshall Street in Rockford, Illinois, as shown in **Figure 1**. The purpose of the study was to collect soil and groundwater data from Area 4 for use in preparation of the final Area 4 remedial design (RD). The Area 4 RD is being prepared to meet the requirements of the Operable Unit (OU) 3 Record of Decision (ROD) dated June 11, 2002.

The phase II pre-design investigation activities were planned to include an extraction well installation, pump test, and pilot study. These activities were not completed during this time because of access restrictions to the property. The property owner rescinded the access agreement for the site on October 24, 2004 and all onsite activities ceased at that time.

Previous investigations have documented free product contamination below a former loading dock area immediately adjacent to the southern portion of the former Swebco building as shown in **Figure 2**. This contamination in the former loading dock area has been identified as the primary source material for Area 4 groundwater contamination. A secondary source of contamination has also been identified at the site. This secondary source consists of contamination that has migrated in the shallow groundwater and accumulated in a smear zone across the fluctuating water table west and northwest of the former loading dock area. The objectives for the phase II pre-design field investigation include:

- Define the extent of contaminated soil requiring remediation via Low Temperature Thermal Desorption (LTTD).
- Assess the horizontal and vertical extent of site related impacts to groundwater in the vicinity of Area 4.

- Identify local area stratigraphy and hydraulic properties that may impact contaminant distribution and groundwater recovery.

This memorandum was prepared to present the results of the recent phase II pre-design field investigation and specifically to evaluate free product contamination in soils above the water table at Area 4. Free product contamination has been detected during previous investigations near the water table west of the former loading dock area and above the water table beneath the former Swebco building, but the extent of contamination has not been clearly defined.

Free product contamination beneath the former Swebco building was not able to be investigated during the phase II pre-design field study activities. The former Swebco building is currently occupied by the H&H Wood Products and Pallets Company, a wooden pallet repair and manufacturing business. The owner of this business did not grant access to the interior portions of the building during the phase II pre-design sampling.

Field Study Activities

Except as noted, all phase II pre-design field study activities, including sampling and analysis, were conducted in accordance with the CDM Southeast Rockford Groundwater Contamination Superfund Site Source Area 4 Final Phase II Pre-Design Sampling and Analysis Plan (SAP), and the Final Quality Assurance Project Plan (QAPP) Addendum. Both documents are dated June 30, 2005. All deviations from the SAP were discussed with the Illinois EPA PM, Thomas Williams, prior to making field changes. Field changes were documented in the field notes and are described in this memorandum.

Direct-Push Soil Sampling - August / September 2005

The Area 4 Phase II Pre-Design direct-push soil sampling took place from August 29 through September 2, 2005. Soil sampling was proposed at 15 locations comprising a grid around the former dock area. Proposed locations are shown on Figure 4-1 of the SAP.

As part of the Phase II field investigation, CDM collected soil samples from 17 boring locations (GP-01 through GP-17) as shown in Figure 3. The additional soil borings were completed to further investigate the secondary source of contamination west and northwest of the primary source area. Borings were drilled in the parking lot to the west and northwest of the former dock area, within the former dock area, and directly east of the former Swebco building. Borings were not advanced within the former Swebco building as proposed in the SAP because access to the interior of the building was denied by the property owner. The soil borings were located to define the extent of free product soil contamination above the water table in the vicinity of the source area and to determine the area required for excavation.

CDM advanced soil borings GP01 through GP17 using both track-mounted and truck-mounted Geoprobe® 6600 series direct-push drill rigs. This work was performed by CDM's drilling subcontractor, On-site Environmental Services, Inc., of Sun Prairie, Wisconsin. Soil

samples were collected in disposable 1.25-inch diameter acetate liners using Geoprobe® dual tube sampling equipment. The liners were cut open and the subsurface lithology was logged using the United Soil Classification System (USCS). Soil boring logs are included in **Appendix A**. Soil was field screened using a photo ionization detector (PID), and a Sudan IV dye test was also performed on selected soil samples to determine the presence of free product. All field observations were recorded on the soil boring logs. Soil borings were backfilled with bentonite chips and then hydrated with potable water.

Soil samples for on-site laboratory analysis were collected from depths of approximately 12, 22, and 32 feet below ground surface (bgs) to establish a vertical contaminant profile of soil above the water table (approximately 32 feet bgs). A total of 50 soil samples, including five duplicate, three MS/MSD, and two rinsate samples, were collected for analysis of target volatile organic compounds (VOCs) by on-site gas chromatography/mass spectroscopy (GC/MS). The on-site analysis was performed by NewAge/Landmark Mobile Laboratory Services of Benton Harbor, Michigan. The target VOCs for on-site laboratory analysis were chosen based on previous investigations and identified contaminants of concern for Area 4. The target VOC analytes include 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), 1,2-dichloroethane (1,2-DCA), tetrachloroethene (PCE), trichloroethene (TCE), *cis*- and *trans*-1,2-dichloroethene (*c*- and *t*-1,2-DCE), 1,1-dichloroethene (1,1-DCE), chloroform, vinyl chloride (VC), carbon tetrachloride, chlorobenzene; and benzene, toluene, ethylbenzene, and xylenes (BTEX).

The sample identifications for the soil samples include the source area, the soil boring number, the interval designation (A, B, or C), and the depth of each collected sample (e.g., A4-GP02B-22'). The results of direct-push soil sampling are presented in **Table 1** and are discussed later in this memorandum. **Figure 4** presents the results for 1,1,1-TCA, the primary VOC contaminant at Area 4. The complete laboratory reports from New Age/Landmark for the on-site GC/MS analysis are included in **Appendix B**.

Ten percent of the direct-push soil samples were also analyzed for medium detection limit (MDL) target compound list (TCL) VOCs through the U.S Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP). The samples analyzed through CLP include a total of five soil samples, one duplicate sample, one MS/MSD sample, and one rinsate sample. All samples were collected using protocols specified in the SAP. These samples were collected to check the results of the on-site GC/MS. The complete CLP analytical and data validation reports are included in **Appendix C**.

Direct-Push Groundwater Sampling - August / September 2005

The Area 4 Phase II Pre-Design direct-push groundwater sampling took place from August 31 through September 2, 2005. Groundwater sampling was conducted at five locations based on the direct-push soil sampling results. The groundwater screening points are numbered MW01, MW03, MW06, MW07, and MW16, reflecting the number of the adjacent direct-push soil boring location. Locations are shown on **Figure 3**.

The groundwater screening points were advanced with a truck-mounted Geoprobe® 6600 series direct-push drill rig. The SAP proposed that groundwater samples would be collected at 10-foot intervals from 100 feet bgs to the water table to establish a vertical contaminant profile for groundwater. However, the Geoprobe® rig met refusal at each sampling location before reaching 100 feet bgs. The depth of refusal ranged from 71 to 84 feet bgs. It was subsequently determined that a clay layer exists below the site at an approximate depth of 60 feet bgs.

Groundwater samples were collected using a Geoprobe® Screen Point 15 well point groundwater sampler. The sampler was driven to refusal and groundwater was collected at 10-foot intervals up to the water table as the sampler was retracted from the boring. New polyethylene tubing with a stainless steel check-valve was used to collect the groundwater samples from a 0.004-inch slotted stainless steel screen. Samples were collected from the center of the 4-foot long screen. Prior to sampling each interval, approximately 1.5 to 2 gallons of water were purged to ensure the samples would be representative of each depth interval. Upon completion of groundwater sampling, the borings were re-entered and a cement/bentonite grout was emplaced from the bottom up during rod removal.

A total 27 groundwater samples, including three duplicate, two MS/MSD, and two field blank samples were collected for analysis of target VOCs by on-site GC/MS. The target VOCs for the direct-push groundwater samples were the same as the direct-push soil samples. The sample identifications for the direct-push groundwater samples include the source area, the groundwater sampling point number, and the depth of each collected sample (e.g., A4-MW03-50'). The results of direct-push groundwater sampling are presented in Table 2 and are discussed later in this memorandum. Figure 5 presents the results for 1,1,1-TCA from the onsite groundwater sampling adjacent to the source area. The complete laboratory reports from New Age/Landmark for the on-site GC/MS analysis are included in Appendix B.

Ten percent of the groundwater samples collected were also analyzed for low detection limit (LDL) TCL VOCs through USEPA CLP. The samples analyzed through CLP include three groundwater samples, one duplicate sample, one MS/MSD sample, and one field blank sample. All samples were collected using protocols specified in the SAP. These samples were collected to check the results of the on-site GC/MS. The complete CLP analytical and data validation reports are included in Appendix C.

Multi-level Well Installation and Development – September 2005

The multi-level well installation at Area 4 took place from September 27 through September 30, 2005. The multi-level well (MLW01) was installed in the parking lot of the former Swebco Building west of the former loading dock area at the location shown in Figure 3. The soil boring for the multi-level well was completed with a sonic drill rig operated by CDM's drilling subcontractor, Boart Longyear of Schofield, Wisconsin. Soil was continuously sampled using a 10-foot long core barrel and logged by CDM's field geologist in accordance with the USCS. Soil was field screened using a PID and all readings were noted on the soil

boring logs. A Sudan IV dye test was also performed on soil samples selected based on PID readings and visual observations to determine the presence of free product. Boring logs are included in **Appendix A**.

Ten soil samples were collected from soil cores during drilling of the multi-level well including one duplicate sample, one MS/MSD sample, and one rinsate sample. Field samples were collected at 24, 29, 34, 40, 50, 60.5, 61.5, 63, and 70 feet bgs. These locations were based on field observations of free product staining near the water table and position relative to the clay layer encountered at 61 feet bgs. The sample identifications for these soil samples include the source area, the multi-level well number, and the depth of each collected sample (e.g., A4-MLW01-29').

USEPA CLP field sampling protocols, chain-of-custody and shipping procedures were used for the soil sample collection. All soil samples were analyzed for MDL TCL VOCs through USEPA CLP. The results of sonic boring soil sampling are presented in **Table 3** and are discussed later in this memorandum. The complete CLP analytical and data validation reports are included in **Appendix C**.

The borehole was advanced to a depth of 72 feet bgs and a 4-inch diameter PVC monitoring well was installed with five separate screened intervals. The screened intervals are five feet in length and were placed at 30 to 35, 39 to 44, 48 to 53, 57 to 62, and 66 to 71 feet bgs. A 0.02-inch slotted screen was used for the four shallowest screened intervals and a sand pack consisting of Red Flint® #40 sand was placed in the annular space surrounding the screen. A 0.01-inch slotted screen was used for deepest interval (63 to 69 feet bgs) and a sand pack consisting of Red Flint® #10 sand was placed in the annular space. A minimum 2-foot thick bentonite seal was placed between each screened interval. The complete well construction detail is included in **Appendix A**.

Prior to the installation of the Solinst Waterloo® Multi-Level Well System, each screened interval was developed with a pump and surge technique. Development continued until groundwater turbidity at each interval was less than ten nephelometric turbidity units (NTU). Development activities produced 3,000 gallons of purge water. The water was stored onsite in two 1,500 gallon polyethylene tanks. The purge water was planned to be treated with the temporary treatment system as part of the pump test and pilot study; however due to access restrictions and the cancellation of the pump test and pilot study, the water was disposed of on October 31, 2005 by Clean Harbors, Inc. of Chicago, Illinois.

After well development, the Solinst Waterloo® Multi-level Well System was installed. The multi-level well system includes a ¾-inch diameter bladder pump and vibrating wire pressure transducer with each screened interval. Each screened interval is separated within the casing by a permanent Waterloo® packer that forms a seal against the PVC casing.

Multi-level Well Sampling - October 2005

The multi-level well was sampled on October 14, 2005. Each of the five screened intervals was purged and sampled separately in accordance with low-flow sampling procedures in the Source Area 4 Phase II Pre-Design SAP. Sampling was performed using the pre-installed dedicated bladder pumps that were included with the Solinst Waterloo® Multi-level Well System. Field measurements of pH, temperature, specific conductance, turbidity, dissolved oxygen, and oxidation /reduction potential were taken at regular intervals during purging. After the parameters had stabilized, a groundwater sample was collected. The groundwater sampling log sheets containing the groundwater quality parameter data are presented in **Appendix D**.

The sample identifications for the different screened intervals include the source area, the multi-level well number, the port number from the well manifold, and the depth of each bladder pump intake (e.g., A4-MLW01-5-33.5'). USEPA CLP field sampling protocols, chain-of-custody, and shipping procedures were used for groundwater sample collection. All groundwater samples were analyzed for LDL TCL VOCs through USEPA CLP. The analytical results of the Area 4 Target VOCs are presented in **Table 4** and are discussed later in this memorandum. The complete CLP analytical and data validation reports are included in **Appendix C**.

Monitoring Well Installation and Development - October / November 2005

Area 4 monitoring well installation and development took place from October 24 through November 2, 2005. One on-site extraction well, one on-site monitoring well, and four off-site monitoring wells were proposed to be installed during this time; however, on October 24, 2005, the property owner rescinded on-site access. Therefore, only the installation of the off-site monitoring wells could be completed. On October 25, 2005, CDM and the drilling subcontractor, Boart Longyear, began well installation. The four off-site monitoring wells (MW22A, MW130B, MW401A, and MW401B) were advanced down-gradient of Area 4 at the locations shown in **Figure 2**.

The monitoring wells were installed using a sonic drilling rig. Soil was continuously sampled using a 6-inch core barrel and logged by CDM's field geologist in accordance with the USCS. Soil was field screened using a PID and all readings were noted on the soil boring logs. A Sudan IV dye test was also performed on soil samples selected based on PID readings and visual observations to determine the presence of free product. Boring logs are included in **Appendix A**. No soil samples were collected for laboratory analysis.

The monitoring well installations were completed in accordance with procedures in the Source Area 4 Pre-Design SAP. The monitoring wells were constructed of 2-inch diameter PVC with 0.02-inch slotted screens within 6-inch diameter boreholes. MW22A was screened from 28.5 to 38.5 feet bgs, MW130B was screened from 45 to 55 feet bgs, MW401A was screened from 28 to 38 feet bgs, and MW401B was screened from 61 to 66 feet bgs. Complete

well construction details for each monitoring well are provided in **Appendix A**. The wells are protected at the ground surface with locking caps and traffic-grade, flush mount covers.

Following well installation, the monitoring wells were developed by Boart Longyear using a Smeal® development rig. Two existing off-site monitoring wells (MW22B and MW32) were also redeveloped and repaired during this mobilization. Development and redevelopment of the monitoring wells consisted of surging the screened interval, and purging water from the well with a submersible pump. Water was purged from the wells until turbidity readings were approximately 10 NTU. Between 225 and 375 gallons of groundwater were removed from each well during development.

The existing monitoring wells MW22B and MW32 had not been sampled in over 10 years and required redevelopment and minor repairs prior to being sampled. MW22B was buried beneath several inches of soil and grass. The well was located with the use of a metal detector and the well was in generally good condition. The bolts for the cover were replaced and a locking cap was added to the top of the casing. The lock on the flush mount pad for MW32 could not be opened and the entire pad was removed and replaced. A new locking cap was also added to the top of casing.

The locations and elevations of all new newly installed monitoring wells and the existing wells MW22B, MW32, and MW130A were surveyed by CDM's professional land surveying subcontractor, Missman Stanley & Associates of Rockford, Illinois, on November 22, 2005. Survey information is recorded on the boring logs presented in **Appendix A**.

Monitoring Well Sampling – November 2005

Groundwater sampling of seven off-site wells in the vicinity of Area 4 was conducted on November 21 and 22, 2005. These wells include MW22A and B, MW32, MW130A and B, and MW401A and B. Well construction details for these wells are provided in **Table 5**.

The wells were purged with a low-flow submersible pump in accordance with the Source Area 4 Pre-Design SAP. Field measurements of pH, temperature, specific conductance, turbidity, dissolved oxygen, and oxidation/reduction potential were taken at regular intervals during purging. After the parameters stabilized, a groundwater sample was collected. The groundwater sampling log sheets containing the groundwater quality parameter data are presented in **Appendix D**.

USEPA CLP field sampling protocols, chain-of-custody and shipping procedures were used for groundwater sample collection. All groundwater samples were analyzed for LDL TCL VOCs through the USEPA CLP. The analytical results of the Area 4 Target VOCs are presented in **Table 6** and are discussed in the next section of this memorandum. The complete CLP analytical and data validation reports are included in **Appendix C**.

Analytical Results and Contaminant Observations

Remediation Goals

Soil and groundwater results were compared to Remediation Goals (RG) for Area 4. Soil RGs are included in Table 1 and groundwater RGs are included in Table 2.

The OU3 ROD, dated June 11, 2002, established RGs for the following VOCs: 1,1-DCE, 1,1,1-TCA, and TCE. Illinois EPA subsequently established RGs for 1,1,2-TCA, carbon tetrachloride, and PCE. Both of these RG sets are documented in the Area 4 Draft Final Performance Standards Verification Plan dated September 13, 2004. The RGs for the other Area 4 Target VOCs were taken from Illinois EPA's Tiered Approach to Corrective Action Objectives (TACO) Tier 1 Migration to Groundwater standards for soil and Class I Groundwater standards for groundwater.

Soil Results

The Area 4 Target VOC soil results from the phase II pre-design field sampling are presented in Tables 1 and 3. Figure 4 also presents the results for 1,1,1-TCA, the primary contaminant of concern at Area 4, from the onsite soil sampling adjacent to the former loading dock area. Figure 4 illustrates in plan view that the secondary source of contamination at the site has migrated along the water table/smear zone interval in the northwest direction from the former loading dock area. The estimated 9,118 microgram per kilogram (ug/kg) 1,1,1-TCA contour in Figure 4 corresponds to the soil RG for 1,1,1-TCA. It is based on the results from this investigation, as well as results from previous investigations which were reported in the Area 4 Technical Memorandum dated April 21, 2004. Results from previous investigations have helped define the extent of contamination to the north and south. The soil results presented in Figure 4 also show that 1,1,1-TCA contamination west and northwest of the loading dock is generally limited to the water table/smear zone interval and is not present in the shallow soils above this interval.

Soil results exceeded the RGs at the water table/smear zone interval in borings GP01, GP06, GP07, GP08, GP09, GP13, GP15, and MLW01. Most of the exceedances are associated with 1,1,1-TCA; however, only PCE exceeded RGs in GP14 and GP15. RGs were also exceeded in one of the samples from within the former loading dock area (GP12 at 3 feet bgs). Outside of the former loading dock area, no VOC contamination was detected above the water table/smear zone at concentrations greater than the RGs.

The soil borings GP12 and GP13 were located within the former loading dock area. These borings were advanced to 4 feet bgs and sampled for waste characterization purposes for the interim soil removal that was completed on September 13, 2005. Free product contamination was observed at each of these borings beginning at less than one foot bgs. In addition, soil boring GP13 was subsequently advanced with sampling to a depth of 50 bgs to obtain a visual profile of contamination and free product directly below the former loading dock area.

The thickness of free product staining at the water table/smear zone onsite was investigated at boring locations GP09, GP13, GP15, and MLW-01. The free product staining at the site was observed at thicknesses of 7.5, 16, 9, and 13 feet at locations GP09, GP13, GP15, and MLW01, respectively. The analytical results for the soil samples from within this stained interval indicated there are also significant concentrations of hydrocarbon compounds which are not Area 4 Target VOCs. The results from confirmatory samples analyzed through the USEPA CLP reveal over 40 Tentatively Identified Compounds (TICs), which include unknown compounds and VOC compounds not included in the target VOC list. Many of the TICs are cyclic, branched, and straight chain alkanes. The results for the TICs are included in the CLP data validation reports included in **Appendix C**.

The direct-push drilling subcontractor reported denser sediments beginning at depths of 60, 58, 64, 70, and 61 feet bgs at locations MW01, MW03, MW06, MW07, and MW16, respectively. The boring GP17 was advanced to investigate the denser sediments. At GP17, the dual tube sampler was driven with a drive point and piston to a depth of 65 feet bgs, and a sample was collected from 65 to 68 feet bgs where high plasticity, fat clay was observed. A complete description is presented in the boring log included in **Appendix A**. A sample of the clay from 66 feet bgs was analyzed for target VOCs and the results are presented in **Table 1** and **Figure 4**.

Groundwater Results

The Area 4 Target VOC groundwater results from the phase II pre-design field sampling are presented in **Tables 2, 4** and **6**. **Figure 5** also presents the results for 1,1,1-TCA from the onsite groundwater sampling adjacent to the source area. **Figure 5** illustrates in plan view that the TCA contamination has migrated along the water table surface in the northwest direction and that TCA contamination in groundwater west of the loading dock is generally limited to the shallow water table. The estimated 200 microgram per liter (ug/L) 1,1,1-TCA contour in **Figure 5** corresponds to the RG for 1,1,1-TCA in groundwater. It is based on the results from this investigation as well as results from previous investigations which were reported in the Area 4 Technical Memorandum dated April 21, 2004. The results in **Figure 5** show the VOC contamination typically highest in shallow groundwater. Contaminant concentrations rapidly decrease below the interval of free product staining and then increase within the clay at 60 feet bgs.

Groundwater results exceeded the RGs at direct-push locations MW01 (32 feet), MW06 (32 and 40 feet), MW07 (32, 70, and 80 feet), and MW16 (32 feet). Groundwater results also exceeded the RGs at monitoring well locations MW130A, MW401A, and MLW01 (Port 5 - approximately 33.5 feet bgs).

Data Interpretation and Evaluation

Soil

The primary source of chlorinated hydrocarbon contamination at Area 4 is the free product, composed primarily of 1,1,1-TCA, in the shallow soil beneath the former loading dock area. The results of the phase II field investigation and previous investigations indicate that the free product contamination in soils above the water table/smear zone at Area 4 does not extend west of the former loading dock area. This shallow free product contamination appears to be limited to the area underneath the former loading dock area and underneath part of the southeast portion of the former Swebco building.

Previous soil investigations at Area 4 have identified product contamination that has migrated laterally to the east, beneath the former Swebco building. Soil sampling was conducted on March 3, 2004 and free product contamination was identified starting at approximately 12 feet bgs beneath the building and continuing down to the water table. Details of the March 2004 sampling are presented in the Area 4 Field Study Technical Memorandum dated April 21, 2004. Free product contamination was not detected in the two borings, GP10 and GP11, east of the former Swebco building. These borings bracket the contamination to the east; however additional sampling is required to determine the quantity of impacted soils above the water table underneath the building. Sampling beneath the building was not completed during this investigation because access was not granted to the interior of the building.

The secondary source at Area 4 consists of the contamination that has migrated west and northwest from the primary source along the water table. Analytical results and contaminant observations from the site soil borings indicate that the primary contamination source migrated vertically from the loading dock area to the water table and then migrated laterally in the direction of groundwater flow. Fluctuation in the groundwater table elevation created the smear zone.

The results of the phase II investigation, as well as previous investigations, document that the secondary contaminant source forms a plume that extends northwest of the former loading dock area as shown in Figure 4. This secondary source is marked by free product staining from up to several feet above the water table to over ten feet below the water table. The free product staining extends northwest from the former loading dock area towards Marshall Street but does not appear to cross Marshall Street. The boring for MW401B, which is located down gradient of the primary source area across Marshall Street, did not reveal any free product staining. Soil sampling results also show that outside the secondary contamination source chlorinated solvent contamination rapidly decreases.

The analytical results of the soil samples collected from within the secondary source indicate that this contamination also consists of many light non-aqueous phase liquids (LNAPLs) in addition to the Area 4 Target VOCs, which are primarily chlorinated solvents. The LNAPLs consist of cyclic, branched, and straight chain alkanes, as well as other unknown hydrocarbon

compounds. The presence of the LNAPL helps explain why the secondary contamination source is limited to the water table/smear zone interval. The LNAPLs "float" on the groundwater and have carried the chlorinated solvent contamination with them.

The soil beneath Area 4 generally consists of fine to medium sand above the water table and grades to a medium to coarse sand below the water table. Further beneath the water table, the sediments grade to coarse sand and gravel until reaching a clay layer at approximately 60 feet bgs. These coarse sediments below the water table result in a relatively high hydraulic conductivity in the shallow groundwater interval. This relatively high hydraulic conductivity will make the remedial alternative of excavation and treatment via LTTD for the secondary source problematic because of the need to dewater the excavation.

The clay located at approximately 60 feet bgs has also been identified as a potential third source of contamination at Area 4. The soil sample results from GP17 indicated that chlorinated solvent contamination has likely migrated vertically to the clay and over time has at least partially penetrated this layer. The thickness of clay was not determined during the phase II field investigation. Further investigation is required to evaluate VOC contamination within and beneath the clay.

Groundwater

Results from the phase II field investigation indicate that groundwater contamination at Area 4 is mainly concentrated in the shallow groundwater within and adjacent to the secondary contamination source. This secondary source forms a shallow groundwater plume that has migrated northwest from the former loading dock area as shown in Figure 5. Sampling results reveal that contamination in groundwater rapidly decreases cross-gradient of the secondary source plume. However, downgradient of the secondary source, chlorinated solvent contamination at concentrations above Area 4 RGs is migrating offsite, as observed at monitoring well MW401A. Elevated 1,1,1-TCA concentrations in shallow groundwater were also observed at the further down-gradient locations, MW22A and MW130A.

Sampling results from groundwater beneath the secondary source of contamination and above the clay (approximately 40 to 60 feet bgs) document only low-level concentrations of chlorinated hydrocarbon contamination. The contamination detected within this interval is below groundwater RGs for Area 4.

Data from this phase II pre-design field investigation did not document any evidence of "pooled" solvent contamination on the clay beneath the site. The intake at Port 2 of the multi-level well (screened interval 57 to 62 feet bgs) was placed directly at the sand-clay boundary and only low-level VOC contamination, below the Area 4 RGs, was detected. However, groundwater within the clay underneath Area 4 does contain VOC contamination that exceeds the RGs for 1,1,1-TCA. The presence of chlorinated solvents in the clay below the approximately 30 feet of saturated sand and gravel indicate that some density driven transport of these constituents has occurred in the past. The continued presence of chlorinated solvent contamination within the clay is likely a result of the clay's low

permeability and solvent contamination sorbing onto the clay particles. The chlorinated solvents within the clay may be providing a continuing source of groundwater contamination. Further investigation is required to evaluate VOC contamination within and beneath the clay.

Data Usability Summary

The Final QAPP dated June 11, 2003 and the Draft - Source Area 4 Phase II Pre-Design QAPP Addendum dated June 30, 2005 present the project data quality objectives (DQOs); measurement quality objectives including precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters; and the data verification and validation requirements.

All field QA/QC samples were collected in accordance with the Source Area 4 Phase II Pre-Design SAP and QAPP Addendum. Field QA/QC objectives were accomplished through the use of appropriate sampling techniques and collection of confirmatory samples, field duplicates, field blanks, and trip blanks.

Analytical QA/QC was assessed by internal QC checks, calibration checks, method blanks, surrogate spikes, adherence to holding times, laboratory control samples (LCS), and matrix spike/matrix spike duplicates (MS/MSD). These QA/QC samples and procedures are collected and followed to insure that all results are representative of environmental conditions at the time of sampling.

Data validation was completed by USEPA in accordance with the standards set forth in the Area 4 QAPP Addendum. Data validation identified holding time exceedances for several of the soil samples collected during the installation of the multi-level monitoring well. All samples were received by CLP analytical laboratory within holding time requirements, however the VOC analysis for the samples from 29 and 34 feet bgs were not completed until after the holding time limit expired. The holding time exceedance for these samples caused the results for all compounds, with the exception of 1,1,1-TCA, to be rejected. The estimated concentrations of 1,1,1-TCA from diluted samples were accepted and the results are presented in **Table 3** and the data validation reports are included in **Appendix C**. The rejected data from these samples do not adversely affect the project objectives, as all other sample results are considered usable.

References

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Analytical Results for Target Volatile Organic Compounds
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Analyte	Remediation Goal (ug/kg)	A4-GP01A 10'	A4-GP01B 20'	A4-GP01C 32'	A4-GP02A 12'	A4-GP02B 22'	A4-GP02C 32'
		8/29/2005	8/29/2005	8/29/2005	8/29/2005	8/29/2005	8/29/2005
1,1,1-TRICHLOROETHANE	9118	< 2	10	82000 D	13	3.7	19
1,1,2-TRICHLOROETHANE	20*	< 2	< 2	< 279	< 3	< 2	< 3
1,1-DICHLOROETHANE	23000*	< 2	< 2	< 279	< 3	< 2	< 3
1,1-DICHLOROETHANE	60	< 2	< 2	1500	< 3	< 2	< 3
1,2-DICHLOROETHANE	20*	< 2	< 2	< 279	< 3	< 2	< 3
BENZENE	30*	< 2	< 2	< 279	< 3	< 2	< 3
CARBON TETRACHLORIDE	70*	< 2	< 2	< 279	< 3	< 2	< 3
CIS-1,2-DICHLOROETHENE	400*	< 2	< 2	< 279	< 3	< 2	< 3
ETHYLBENZENE	13000*	< 2	< 2	300	< 3	< 2	< 3
TETRACHLOROETHENE	60*	< 2	< 2	480	< 3	< 2	< 3
TOLUENE	12000*	< 2	< 2	< 279	< 3	< 2	< 3
TRANS-1,2-DICHLOROETHENE	700*	< 2	< 2	< 279	< 3	< 2	< 3
TRICHLOROETHENE	60	< 2	< 2	400	< 3	< 2	< 3
VINYL CHLORIDE	10*	< 4	< 5	< 557	< 5	< 5	< 6
XYLENES (TOTAL)	150000*	< 6	< 7	2410	< 8	< 7	< 9

Notes:

ug/kg = micrograms per kilogram

Soil results given in micrograms per kilogram

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class 1 soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP03A 12'	A4-GP03B 22'	A4-GP03C 32'	A4-GP04A 12'	A4-GP04B 22'	A4-GP04C 32'
		8/29/2005	8/29/2005	8/29/2005	8/29/2005	8/30/2005	8/30/2005
1,1,1-TRICHLOROETHANE	9118	4.8	4.9	29	8.3	3.2	8.8
1,1,2-TRICHLOROETHANE	20*	<2	<2	<3	<2	<2	<2
1,1-DICHLOROETHANE	23000*	<2	<2	<3	<2	<2	<2
1,1-DICHLOROETHENE	60	<2	<2	<3	<2	<2	<2
1,2-DICHLOROETHANE	20*	<2	<2	<3	<2	<2	<2
BENZENE	30*	<2	<2	<3	<2	<2	<2
CARBON TETRACHLORIDE	70*	<2	<2	<3	<2	<2	<2
CIS-1,2-DICHLOROETHENE	400*	<2	<2	<3	<2	<2	<2
ETHYLBENZENE	13000*	<2	<2	<3	<2	<2	<2
TETRACHLOROETHENE	60*	<2	<2	<3	<2	<2	<2
TOLUENE	12000*	<2	<2	<3	<2	<2	<2
TRANS-1,2-DICHLOROETHENE	700*	<2	<2	<3	<2	<2	<2
TRICHLOROETHENE	60	<2	<2	<3	<2	<2	<2
VINYL CHLORIDE	10*	<4	<4	<5	<4	<3	<4
XYLENES (TOTAL)	150000*	<6	<6	<8	<6	<5	<7

Notes:
 ug/kg = micrograms per kilogram
 Soil results given in micrograms per kilogram
 D = Result is from a diluted sample
 E = Estimated, results beyond range of calibration
 Values in boldface with dark borders exceed the Remediation Goal
 Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class 1 soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP05A 12'	A4-GP05B 22'	A4-GP05C 32'	A4-GP06A 12'	A4-GP06B 22'	A4-GP06C 32'
		8/30/2005	8/30/2005	8/29/2005	8/30/2005	8/30/2005	8/30/2005
1,1,1-TRICHLOROETHANE	9118	4.5	4.6	7.1	4.6	24	130000 D
1,1,2-TRICHLOROETHANE	20*	<2	<2	<2	<1	<1	<98
1,1-DICHLOROETHANE	23000*	<2	<2	<2	<1	<1	120
1,1-DICHLOROETHENE	60	<2	<2	<2	<1	<1	1600
1,2-DICHLOROETHANE	20*	<2	<2	<2	<1	<1	<98
BENZENE	30*	<2	<2	<2	<1	<1	<98
CARBON TETRACHLORIDE	70*	<2	<2	<2	<1	<1	<98
CIS-1,2-DICHLOROETHENE	400*	<2	<2	<2	<1	<1	<98
ETHYLBENZENE	13000*	<2	<2	<2	<1	<1	290
TETRACHLOROETHENE	60*	<2	<2	<2	<1	<1	310
TOLUENE	12000*	<2	<2	<2	<1	<1	150
TRANS-1,2-DICHLOROETHENE	700*	<2	<2	<2	<1	<1	<98
TRICHLOROETHENE	60	<2	<2	<2	<1	<1	840
VINYL CHLORIDE	10*	<4	<4	<3	<3	<3	<196
XYLENES (TOTAL)	150000*	<5	<5	<5	<4	<4	1910

Notes:

ug/kg = micrograms per kilogram

Soil results given in micrograms per kilogram

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP07A 12'	A4-GP07B 22'	A4-GP07C 32'	A4-GP08A 12'	A4-GP08B 22'	A4-GP08C 32'
		8/31/2005	8/30/2005	8/30/2005	8/31/2005	8/30/2005	8/30/2005
1,1,1-TRICHLOROETHANE	9118	1.4	19	130000 D	3.1	1400	52000 E
1,1,2-TRICHLOROETHANE	20*	<1	<2	<2	<1	<102	<102
1,1-DICHLOROETHANE	23000*	<1	<2	6.3	<1	120	150
1,1-DICHLOROETHENE	60	<1	2.9	39	<1	<102	290
1,2-DICHLOROETHANE	20*	<1	<2	<2	<1	<102	<102
BENZENE	30*	<1	<2	<2	<1	<102	<102
CARBON TETRACHLORIDE	70*	<1	<2	<2	<1	<102	<102
CIS-1,2-DICHLOROETHENE	400*	<1	<2	<2	<1	<102	<102
ETHYLBENZENE	13000*	<1	<2	23	<1	<102	320
TETRACHLOROETHENE	60*	<1	<2	17	2.3	<102	130
TOLUENE	12000*	<1	<2	13	<1	<102	<102
TRANS-1,2-DICHLOROETHENE	700*	<1	<2	38	<1	<102	<102
TRICHLOROETHENE	60	<1	<2	20	<1	<102	310
VINYL CHLORIDE	10*	<3	<4	<4	<2	<204	<203
XYLENES (TOTAL)	150000*	<4	<6	143	<3	<306	2370

Notes:

ug/kg = micrograms per kilogram

Soil results given in micrograms per kilogram

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class 1 soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP09A 12'	A4-GP09B 22'	A4-GP09C 32'	A4-GP10A 12'	A4-GP10B 22'	A4-GP10C 32'
		8/30/2005	8/30/2005	8/30/2005	8/31/2005	8/31/2005	8/31/2005
1,1,1-TRICHLOROETHANE	9118	13	3.6	120000 E	< 2	< 2	< 1
1,1,2-TRICHLOROETHANE	20*	< 1	< 1	< 102	< 2	< 2	< 1
1,1-DICHLOROETHANE	23000*	< 1	< 1	980	< 2	< 2	< 1
1,1-DICHLOROETHENE	60	< 1	< 1	2300	< 2	< 2	< 1
1,2-DICHLOROETHANE	20*	< 1	< 1	< 102	< 2	< 2	< 1
BENZENE	30*	< 1	< 1	< 102	< 2	< 2	< 1
CARBON TETRACHLORIDE	70*	< 1	< 1	< 102	< 2	< 2	< 1
CIS-1,2-DICHLOROETHENE	400*	< 1	< 1	160	< 2	< 2	< 1
ETHYLBENZENE	13000*	< 1	< 1	< 102	< 2	< 2	< 1
TETRACHLOROETHENE	60*	< 1	< 1	250	< 2	< 2	< 1
TOLUENE	12000*	< 1	< 1	< 102	< 2	< 2	< 1
TRANS-1,2-DICHLOROETHENE	700*	< 1	< 1	< 102	< 2	< 2	< 1
TRICHLOROETHENE	60	< 1	< 1	1100	< 2	< 2	< 1
VINYL CHLORIDE	10*	< 3	< 3	< 203	< 4	< 4	< 3
XYLENES (TOTAL)	150000*	< 4	< 4	530	< 6	< 6	< 4

Notes:

ug/kg = micrograms per kilogram

Soil results given in micrograms per kilogram

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP11A 12'	A4-GP11B 22'	A4-GP11C 32'	A4-GP12 3'	A4-GP13 3'
		8/31/2005	8/31/2005	8/31/2005	8/31/2005	8/31/2005
1,1,1-TRICHLOROETHANE	9118	6.4	<2	3.9	24000	110
1,1,2-TRICHLOROETHANE	20*	<2	<2	<2	<156	<103
1,1-DICHLOROETHANE	23000*	<2	<2	<2	4500	130
1,1-DICHLOROETHENE	60	<2	<2	<2	430	<103
1,2-DICHLOROETHANE	20*	<2	<2	<2	<156	<103
BENZENE	30*	<2	<2	<2	<156	<103
CARBON TETRACHLORIDE	70*	<2	<2	<2	<156	<103
CIS-1,2-DICHLOROETHENE	400*	<2	<2	<2	20000	<103
ETHYL BENZENE	13000*	<2	<2	<2	410	<103
TETRACHLOROETHENE	60*	<2	<2	<2	<156	<103
TOLUENE	12000*	<2	<2	<2	<156	<103
TRANS-1,2-DICHLOROETHENE	700*	<2	<2	<2	<156	<103
TRICHLOROETHENE	60	<2	<2	<2	310	<103
VINYL CHLORIDE	10*	<3	<4	<4	540	<206
XYLENES (TOTAL)	150000*	<5	<6	<5	4600	150

Notes:

ug/kg = micrograms per kilogram

Soil results given in micrograms per kilogram

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP14A 12'	A4-GP14B 25'	A4-GP14C 34'	A4-GP15A 12'	A4-GP15B 22'	A4-GP15C 33.5'
		8/31/2005	8/31/2005	8/31/2005	9/1/2005	9/1/2005	8/31/2005
1,1,1-TRICHLOROETHANE	9118	<2	4.3	4200	<1	2.6	1800
1,1,2-TRICHLOROETHANE	20*	<2	<2	<110	<1	<1	<110
1,1-DICHLOROETHANE	23000*	<2	<2	<110	<1	<1	<110
1,1-DICHLOROETHENE	60	<2	<2	<110	<1	<1	<110
1,2-DICHLOROETHANE	20*	<2	<2	<110	<1	<1	<110
BENZENE	30*	<2	<2	<110	<1	<1	<110
CARBON TETRACHLORIDE	70*	<2	<2	<110	<1	<1	<110
CIS-1,2-DICHLOROETHENE	400*	<2	<2	<110	<1	<1	<110
ETHYLBENZENE	13000*	<2	<2	210	<1	<1	140
TETRACHLOROETHENE	60*	<2	<2	260	<1	<1	140
TOLUENE	12000*	<2	<2	<110	<1	<1	<110
TRANS-1,2-DICHLOROETHENE	700*	<2	<2	<110	<1	<1	<110
TRICHLOROETHENE	60	<2	<2	<110	<1	<1	<110
VINYL CHLORIDE	10*	<4	<4	<220	<2	<3	<219
XYLENES (TOTAL)	150000*	<5	<7	1670	<3	<4	830

Notes:

ug/kg = micrograms per kilogram
 Soil results given in micrograms per kilogram
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 E = Estimated, results beyond range of calibration
 Values in boldface with dark borders exceed the Remediation Goal
 Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class 1 soil component of the groundwater ingestion exposure route values

Table 1
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Soil Samples
Southeast Rockford Area 4
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Analyte	Remediation Goal (ug/kg)	A4-GP16A 12'	A4-GP16B 22'	A4-GP16C 33'	A4-GP17 66-67'
		9/1/2005	9/1/2005	9/1/2005	9/2/2005
1,1,1-TRICHLOROETHANE	9118	<1	2.7	4.9	94
1,1,2-TRICHLOROETHANE	20*	<1	<2	<2	<63
1,1-DICHLOROETHANE	23000*	<1	<2	<2	<63
1,1-DICHLOROETHENE	60	<1	<2	<2	<63
1,2-DICHLOROETHANE	20*	<1	<2	<2	<63
BENZENE	30*	<1	<2	<2	<63
CARBON TETRACHLORIDE	70*	<1	<2	<2	<63
CIS-1,2-DICHLOROETHENE	400*	<1	<2	<2	<63
ETHYLBENZENE	13000*	<1	<2	<2	<63
TETRACHLOROETHENE	60*	<1	<2	<2	<63
TOLUENE	12000*	<1	<2	<2	<63
TRANS-1,2-DICHLOROETHENE	700*	<1	<2	<2	<63
TRICHLOROETHENE	60	<1	<2	<2	<63
VINYL CHLORIDE	10*	<3	<3	<4	<125
XYLENES (TOTAL)	150000*	<4	<5	<7	<188

Notes:

ug/kg = micrograms per kilogram
 Soil results given in micrograms per kilogram
 D = Result is from a diluted sample
 E = Estimated, results beyond range of calibration
 Values in boldface with dark borders exceed the Remediation Goal
 Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I soil component of the groundwater ingestion exposure route values

Table 2
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Groundwater Samples
Southeast Rockford Area 4
Page 1 of 5

Analyte	Remediation Goal (ug/L)	A4-MW01-32'	A4-MW01-40'	A4-MW01-50'	A4-MW01-60'	A4-MW01-70'
		9/1/2005	9/1/2005	9/1/2005	9/1/2005	9/1/2005
1,1,1-TRICHLOROETHANE	200	1600 D	24	20	19	46
1,1,2-TRICHLOROETHANE	5	<5	<5	<1	<1	<1
1,1-DICHLOROETHANE	700*	83	8.6	9.1	8.4	8
1,1-DICHLOROETHENE	7	11	<5	1.4	<1	<1
1,2-DICHLOROETHANE	5*	<5	<5	<1	<1	<1
BENZENE	5*	<5	<5	<1	<1	<1
CARBON TETRACHLORIDE	5	<5	<5	<1	<1	<1
CIS-1,2-DICHLOROETHENE	70*	19	5.6	7.8	8.1	7.8
ETHYLBENZENE	700*	8.8	<5	<1	<1	<1
TETRACHLOROETHENE	5	14	12	1.1	<1	<1
TOLUENE	1000*	<5	<5	1.2	<1	1.1
TRANS-1,2-DICHLOROETHENE	100*	<5	<5	<1	<1	<1
TRICHLOROETHENE	5	12	<5	1.7	1.4	1.1
VINYL CHLORIDE	2*	<10	<10	<2	<2	<2
XYLENES (TOTAL)	10000*	64	<15	<3	<3	<3

Notes:

ug/L = micrograms per liter

Groundwater results given in micrograms per liter

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Table 2
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Groundwater Samples
Southeast Rockford Area 4
Page 2 of 5

Analyte	Remediation Goal (ug/L)	A4-MW03-32'	A4-MW03-40'	A4-MW03-50'	A4-MW03-60'	A4-MW03-70'	A4-MW03-80'
		9/2/2005	9/2/2005	9/2/2005	9/1/2005	9/1/2005	9/1/2005
1,1,1-TRICHLOROETHANE	200	5.4	5.9	8.8	8.9	9.6	13
1,1,2-TRICHLOROETHANE	5	<1	<1	<1	<1	<1	<1
1,1-DICHLOROETHANE	700*	2.7	2.6	7	5.9	8.8	12
1,1-DICHLOROETHENE	7	<1	<1	1.3	1.5	1.8	3.9
1,2-DICHLOROETHANE	5*	<1	<1	<1	<1	<1	<1
BENZENE	5*	<1	<1	<1	<1	<1	<1
CARBON TETRACHLORIDE	5	<1	<1	<1	<1	<1	<1
CIS-1,2-DICHLOROETHENE	70*	1.6	1.8	7.6	7.2	10.1	14
ETHYLBENZENE	700*	<1	<1	<1	<1	<1	<1
TETRACHLOROETHENE	5	<1	<1	<1	<1	<1	<1
TOLUENE	1000*	<1	<1	<1	1.1	<1	<1
TRANS-1,2-DICHLOROETHENE	100*	<1	<1	<1	1	<1	<1
TRICHLOROETHENE	5	<1	<1	<1	<1	<1	<1
VINYL CHLORIDE	2*	<2	<2	<2	1.4	1.5	1.7
XYLENES (TOTAL)	10000*	<3	<3	<3	<2	<2	<2
					<3	<3	<3

Notes:

ug/L = micrograms per liter

Groundwater results given in micrograms per liter

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Table 2
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Groundwater Samples
Southeast Rockford Area 4
Page 3 of 5

Analyte	Remediation Goal (ug/L)	A4-MW06-32'		A4-MW06-40'		A4-MW06-50'		A4-MW06-60'		A4-MW06-70'		A4-MW06-82'	
		9/1/2005		9/1/2005		9/1/2005		9/1/2005		8/31/2005		8/31/2005	
1,1,1-TRICHLOROETHANE	200	3300 D		4000 D		25		14		100		110	
1,1,2-TRICHLOROETHANE	5	10		< 5		< 1		< 1		< 1		< 1	
1,1-DICHLOROETHANE	700*	370		230		11		8.3		6.9		15	
1,1-DICHLOROETHENE	7	230		82		1.9		1.3		1.8		2.7	
1,2-DICHLOROETHANE	5*	< 5		< 5		< 1		< 1		< 1		< 1	
BENZENE	5*	< 5		< 5		< 1		< 1		< 1		< 1	
CARBON TETRACHLORIDE	5	< 5		< 5		< 1		< 1		< 1		< 1	
CIS-1,2-DICHLOROETHENE	70*	18		8.2		8.1		8.1		5		12	
ETHYLBENZENE	700*	8.3		10		< 1		< 1		< 1		< 1	
TETRACHLOROETHENE	5	13		16		1.4		< 1		< 1		1.2	
TOLUENE	1000*	7.4		5.1		< 1		< 1		< 1		< 1	
TRANS-1,2-DICHLOROETHENE	100*	< 5		0.29 J		< 1		< 1		< 1		< 1	
TRICHLOROETHENE	5	30		21		1.6		1.2		1.5		2.7	
VINYL CHLORIDE	2*	< 10		< 10		< 2		< 2		< 2		< 2	
XYLENES (TOTAL)	10000*	61		57		< 3		< 3		< 3		< 3	

Notes:
ug/L = micrograms per liter
Groundwater results given in micrograms per liter
D = Result is from a diluted sample
E = Estimated, results beyond range of calibration
Values in boldface with dark borders exceed the Remediation Goal
Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Table 2
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Groundwater Samples
Southeast Rockford Area 4
Page 4 of 5

Analyte	Remediation Goal (ug/L)	A4-MW07-32'	A4-MW07-40'	A4-MW07-50'	A4-MW07-60'	A4-MW07-70'	A4-MW07-80'
		8/31/2005	8/31/2005	8/31/2005	8/31/2005	8/31/2005	8/31/2005
1,1,1-TRICHLOROETHANE	200	5700 D E	20	8	16	440 D	210
1,1,2-TRICHLOROETHANE	5	13	< 5	< 1	< 1	< 1	< 5
1,1-DICHLOROETHANE	700*	160	6	6.6	6.4	21	32
1,1-DICHLOROETHENE	7	21	< 5	1.2	1	2.5	7.4
1,2-DICHLOROETHANE	5*	< 5	< 5	< 1	< 1	< 1	< 5
BENZENE	5*	< 5	< 5	< 1	< 1	< 1	< 5
CARBON TETRACHLORIDE	5	< 5	< 5	< 1	< 1	< 1	< 5
CIS-1,2-DICHLOROETHENE	70*	39	< 5	7.4	6.4	1.2	9.8
ETHYLBENZENE	700*	14	< 5	< 1	< 1	< 1	< 5
TETRACHLOROETHENE	5	11	11	< 1	< 1	< 1	< 5
TOLUENE	1000*	5.8	< 5	< 1	< 1	< 1	< 5
TRANS-1,2-DICHLOROETHENE	100*	< 5	< 5	< 1	< 1	< 1	< 5
TRICHLOROETHENE	5	22	< 5	1.2	1.2	< 1	< 5
VINYL CHLORIDE	2*	< 10	< 10	< 2	< 2	< 2	< 10
XYLENES (TOTAL)	10000*	108	< 15	< 1	< 3	< 3	< 15

Notes:

ug/L = micrograms per liter

Groundwater results given in micrograms per liter

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Table 2
Analytical Results for Target Volatile Organic Compounds
from Direct-Push Groundwater Samples
Southeast Rockford Area 4
Page 5 of 5

Analyte	Remediation Goal (ug/L)	A4-MW16-32'	A4-MW16-40'	A4-MW16-50'	A4-MW16-60'	A4-MW16-70'	A4-MW16-80'
		9/2/2005	9/2/2005	9/2/2005	9/2/2005	9/2/2005	9/2/2005
1,1,1-TRICHLOROETHANE	200	480 D	12	12	7.2	< 1	< 1
1,1,2-TRICHLOROETHANE	5	< 1	< 1	< 1	< 1	< 1	< 1
1,1-DICHLOROETHANE	700*	27	< 1	6.3	5.6	< 1	< 1
1,1-DICHLOROETHENE	7	5.4	< 1	1.4	< 1	< 1	2.2
1,2-DICHLOROETHANE	5*	< 1	< 1	< 1	< 1	< 1	< 1
BENZENE	5*	< 1	< 1	< 1	< 1	< 1	< 1
CARBON TETRACHLORIDE	5	< 1	< 1	< 1	< 1	< 1	< 1
CIS-1,2-DICHLOROETHENE	70*	1.4	< 1	< 1	< 1	< 1	< 1
ETHYLBENZENE	700*	< 1	< 1	6.3	5.5	< 1	12
TETRACHLOROETHENE	5	< 1	< 1	< 1	< 1	< 1	< 1
TOLUENE	1000*	< 1	< 1	< 1	< 1	< 1	< 1
TRANS-1,2-DICHLOROETHENE	100*	< 1	< 1	< 1	< 1	< 1	< 1
TRICHLOROETHENE	5	1.3	< 1	< 1	< 1	< 1	< 1
VINYL CHLORIDE	2*	< 2	< 2	< 2	< 2	< 2	< 2
XYLENES (TOTAL)	10000*	< 3	< 3	< 3	< 3	< 3	< 3

Notes:

ug/L = micrograms per liter

Groundwater results given in micrograms per liter

D = Result is from a diluted sample

E = Estimated, results beyond range of calibration

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Table 3
Analytical Results for Target Volatile Organic Compounds
from Multi-Level Well Soil Boring Samples
Southeast Rockford Area 4
Page 1 of 2

Analyte	Remediation Goal (ug/kg)	A4-MLW01-24'	A4-MLW01-25'	A4-MLW01-34'	A4-MLW01-40'	A4-MLW01-50'
		9/27/2005	9/27/2005	9/27/2005	9/27/2005	9/27/2005
1,1,1-TRICHLOROETHANE	9118	440 J	130000 J (D)	260 J	870 J	6 J
1,1,2-TRICHLOROETHANE	20*	3 J	< 1300 R	< 1300 R	< 10	< 10
1,1-DICHLOROETHANE	23000*	28	< 1300 R	< 1300 R	5 J	< 10
1,1-DICHLOROETHENE	60	52	< 1300 R	< 1300 R	120 J	< 10
1,2-DICHLOROETHANE	20*	< 11	< 1300 R	< 1300 R	< 10	< 10
BENZENE	30*	< 11	< 1300 R	< 1300 R	< 10	< 10
CARBON TETRACHLORIDE	70*	91	< 1300 R	< 1300 R	< 10	< 10
CIS-1,2-DICHLOROETHENE	400*	5 J	< 1300 R	< 1300 R	< 10	< 10
ETHYLBENZENE	13000*	< 11	< 1300 R	< 1300 R	9 J	< 10
TETRACHLOROETHENE	60*	< 11	< 1300 R	< 1300 R	48 J	< 10
TOLUENE	12000*	< 11	< 1300 R	< 1300 R	2 J	< 10
TRANS-1,2-DICHLOROETHENE	700*	< 11	< 1300 R	< 1300 R	< 10	< 10
TRICHLOROETHENE	60	5 J	< 1300 R	< 1300 R	8 J	< 10
VINYL CHLORIDE	10*	< 11	< 1300 R	< 1300 R	< 10	< 10
XYLENES (TOTAL)	150000*	< 11	< 1300 R	< 1300 R	68 J	< 10

Notes:

ug/kg = micrograms per kilogram
Soil results given in micrograms per kilogram
D = Result is from a diluted sample
J = Result is estimated
R = Results were rejected during data validation due to exceeded holding time
Values in boldface with dark borders exceed the Remediation Goal
Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I soil component of the groundwater ingestion exposure route values

Table 3
Analytical Results for Target Volatile Organic Compounds
from Multi-Level Well Soil Boring Samples
Southeast Rockford Area 4
Page 2 of 2

Analyte	Remediation Goal (ug/kg)	A4-MLW01-60.5'		A4-MLW01-61.5'		A4-MLW01-63'		A4-MLW01-70'	
		9/27/2005		9/27/2005		9/27/2005		9/27/2005	
1,1,1-TRICHLOROETHANE	9118	3 J	< 10	4 J	< 10	5 J	< 10	< 10	< 10
1,1,2-TRICHLOROETHANE	20*		< 10		< 10		< 10		< 10
1,1-DICHLOROETHANE	23000*		< 10		< 10		< 10		< 10
1,1-DICHLOROETHENE	60		< 10		< 10		< 10		< 10
1,2-DICHLOROETHANE	20*		< 10		< 10		< 10		< 10
BENZENE	30*		< 10		< 10		< 10		< 10
CARBON TETRACHLORIDE	70*		< 10		< 10		< 10		< 10
CIS-1,2-DICHLOROETHENE	400*		< 10		< 10		< 10		< 10
ETHYLBENZENE	13000*		< 10		< 10		< 10		< 10
TETRACHLOROETHENE	60*		< 10		< 10		< 10		< 10
TOLUENE	12000*		< 10		< 10		< 10		< 10
TRANS-1,2-DICHLOROETHENE	700*		< 10		< 10		< 10		< 10
TRICHLOROETHENE	60		< 10		< 10		< 10		< 10
VINYL CHLORIDE	10*		< 10		< 10		< 10		< 10
XYLENES (TOTAL)	150000*		< 10		< 10		< 10		< 10

Notes:

ug/kg = micrograms per kilogram
 Soil results given in micrograms per kilogram
 D = Result is from a diluted sample
 J = Result is estimated
 R = Results were rejected during data validation due to exceeded holding time
 Values in boldface with dark borders exceed the Remediation Goal
 Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I soil component of the groundwater ingestion exposure route values

Table 4
Analytical Results for Target Volatile Organic Compounds from Multi-Level Well Groundwater Samples
Southeast Rockford Area 4
Page 1 of 1

Analyte	Remediation Goal (ug/L)	A4-MLW01-5-33.5'	A4-MLW01-4-41'	A4-MLW01-3-49'	A4-MLW01-2-60'	A4-MW01-1-69'
		10/14/2005	10/14/2005	10/14/2005	10/14/2005	10/14/2005
1,1,1-TRICHLOROETHANE	200	2300 D	8.6	10	11	78 D
1,1,2-TRICHLOROETHANE	5	< 100	< 0.5	< 0.5	< 0.5	< 0.5
1,1-DICHLOROETHANE	700*	1300 D	6.8	7.4	6.7	8
1,1-DICHLOROETHENE	7	< 100	1.3	1.5	8	0.96 J
1,2-DICHLOROETHANE	5*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
BENZENE	5*	< 0.5	< 0.5	< 0.5	4.6	< 0.5
CARBON TETRACHLORIDE	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
CIS-1,2-DICHLOROETHENE	70*	< 100	10	11	5	5.3
ETHYLBENZENE	700*	4.9	< 0.5	< 0.5	< 0.5	< 0.5
TETRACHLOROETHENE	5	13	0.36 J	0.40 J	0.39 J	0.27 J
TOLUENE	1000*	4.2	< 0.5	1.2	< 0.5	< 0.5
TRANS-1,2-DICHLOROETHENE	100*	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
TRICHLOROETHENE	5	< 100	1.2	1.5	1.6	0.87
VINYL CHLORIDE	2*	< 100	< 0.5	0.39 J	0.30 J	< 0.5
XYLENES (TOTAL)	10000*	< 100	< 0.5	< 0.5	< 0.5	< 0.5

Notes:

ug/L = micrograms per liter

Groundwater results given in micrograms per liter

D = Result is from a diluted sample

J = Estimated result

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Table 5
Well Details for Area 4 Monitoring Wells Sampled in
November 2005

Well Number	Aquifer Screened	Depth to Screen Base	Screen Length	Top of Casing Elevation	Depth to Water 11/21/05	Static Water Elevation
		(feet bgs)	(feet)	(feet AMSL ¹)	(feet bgs)	(feet AMSL)
MW32	unconsolidated	45	10	733.84	33.71	700.13
MW401A	unconsolidated	38	10	730.35	31.09	699.26
MW401B	unconsolidated	66	5	730.34	31.12	699.22
MW130A	unconsolidated	38	10	728.04	29.32	698.72
MW130B	unconsolidated	55	10	727.52	28.68	698.84
MW22A	unconsolidated	38.5	10	730.35	31.27	699.08
MW22B	unconsolidated	46	10	729.75	30.65	699.10

Notes:

(1) AMSL = Above mean sea level.

Table 6
Analytical Results for Target Volatile Organic Compounds from Monitoring Well Groundwater Samples
Southeast Rockford Area 4
Page 1 of 1

Analyte	Remediation Goal (ug/L)	A4-MW130A 11/21/2005	A4-MW130B 11/21/2005	A4-MW32 11/21/2005	A4-MW22A 11/22/2005	A4-MW22B 11/22/2005	A4-MW401A 11/23/2005	A4-MW401B 11/24/2005
1,1,1-TRICHLOROETHANE	200	230	66	16	50	15	2900	16
1,1,2-TRICHLOROETHANE	5	<13	<3.1	<0.5	<1.6	<0.5	<130	<0.73
1,1-DICHLOROETHANE	700*	11 J	9.1	12 J	0.71 J	11	75 J	13
1,1-DICHLOROETHANE	7	5.1 J	2.4 J	3.4	0.82 J	1.8	36 J	2.4
1,2-DICHLOROETHANE	5*	<13	<3.1	0.2 J	<1.6	<0.5	<130	<0.73
BENZENE	5*	<13	<3.1	<0.5	<1.6	<0.5	<130	<0.73
CARBON TETRACHLORIDE	5	<13	<3.1	<0.5	<1.6	<0.5	<130	<0.73
CIS-1,2-DICHLOROETHENE	70*	<13	15	28	0.40 J	16	<130 J	19
ETHYLBENZENE	700*	<13	<3.1	<0.5	<1.6	<0.5	<130	<0.73
TETRACHLOROETHENE	5	<13	<3.1	0.69 J	0.48 J	0.31 J	<130	0.48 J
TOLUENE	1000*	<13	<3.1	1.2	<1.6	<0.5	<130	<0.73
TRANS-1,2-DICHLOROETHENE	100*	<13	<3.1	0.48 J	<1.6	0.24 J	<130 J	0.27 J
TRICHLOROETHENE	5	3.5 J	2.5 J	3.9	0.78 J	2.3	<130	3
VINYL CHLORIDE	2*	<13	<3.1	<0.5	<1.6	<0.5	<130	<0.73
XYLENES (TOTAL)	10000*	<13	<3.1	<0.5	<1.6	<0.5	<130	<0.73

Notes:

ug/L = micrograms per liter

Groundwater results given in micrograms per liter

D = Result is from a diluted sample

J = Estimated result

Values in boldface with dark borders exceed the Remediation Goal

Remediation Goal as listed in the ROD or subsequently added by IEPA, unless noted with an * when the value is from the TACO Tier 1 Class I Groundwater remediation objective

Figures

BROADWAY

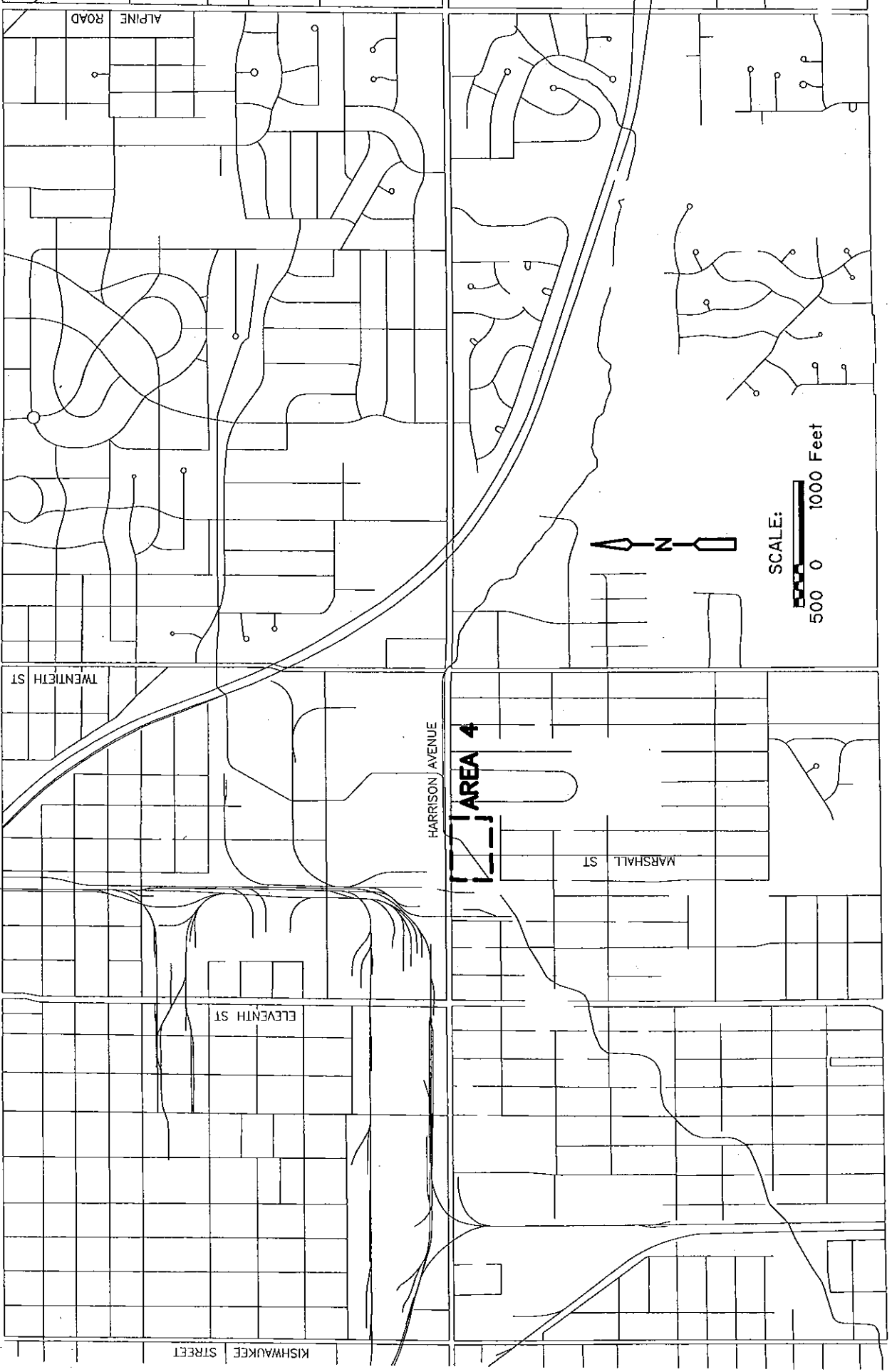


FIGURE 1
AREA 4 PHASE II PRE-DESIGN
LOCATION MAP

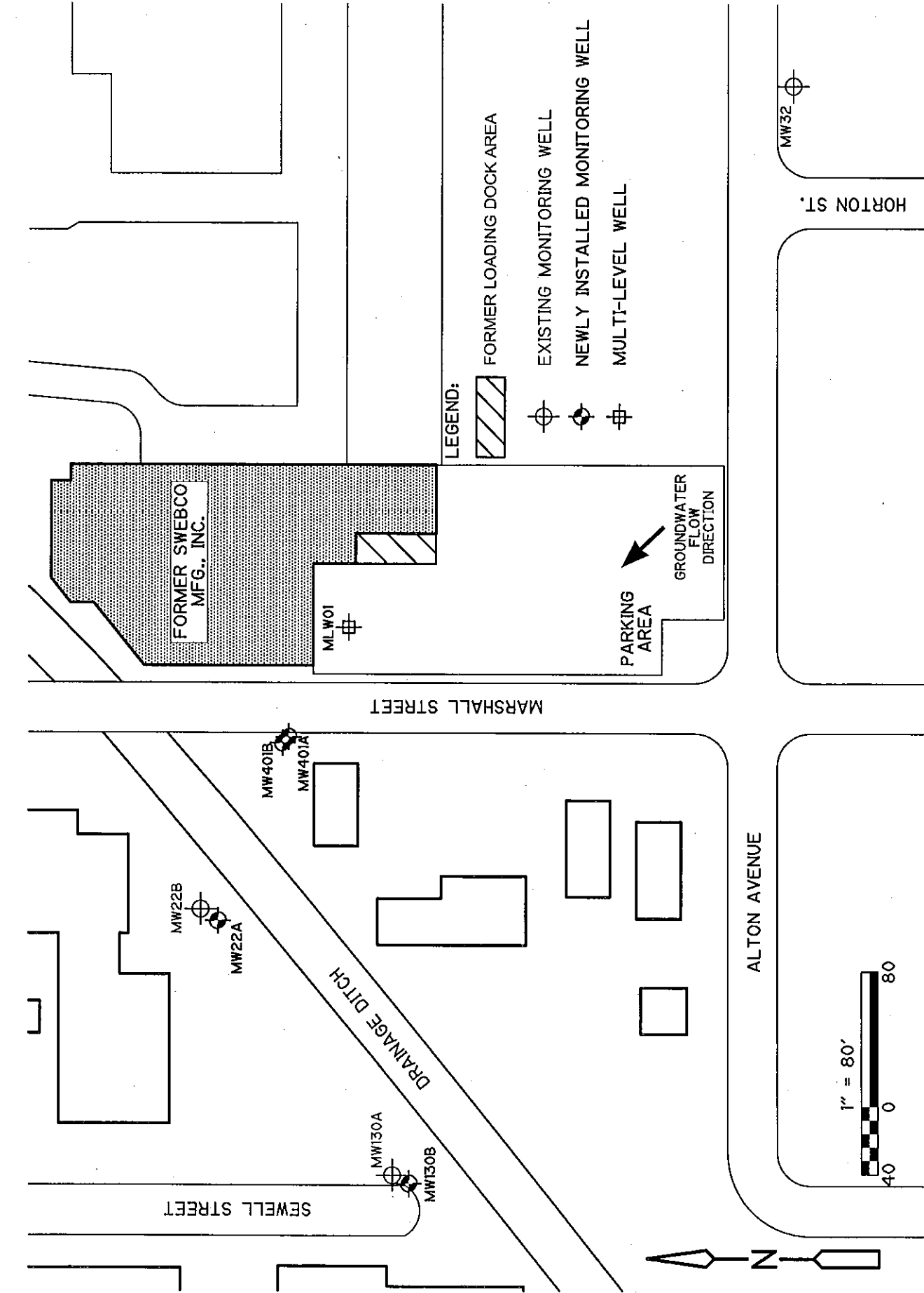


FIGURE 2
AREA 4 PHASE II PRE-DESIGN
SITE LOCATION MAP

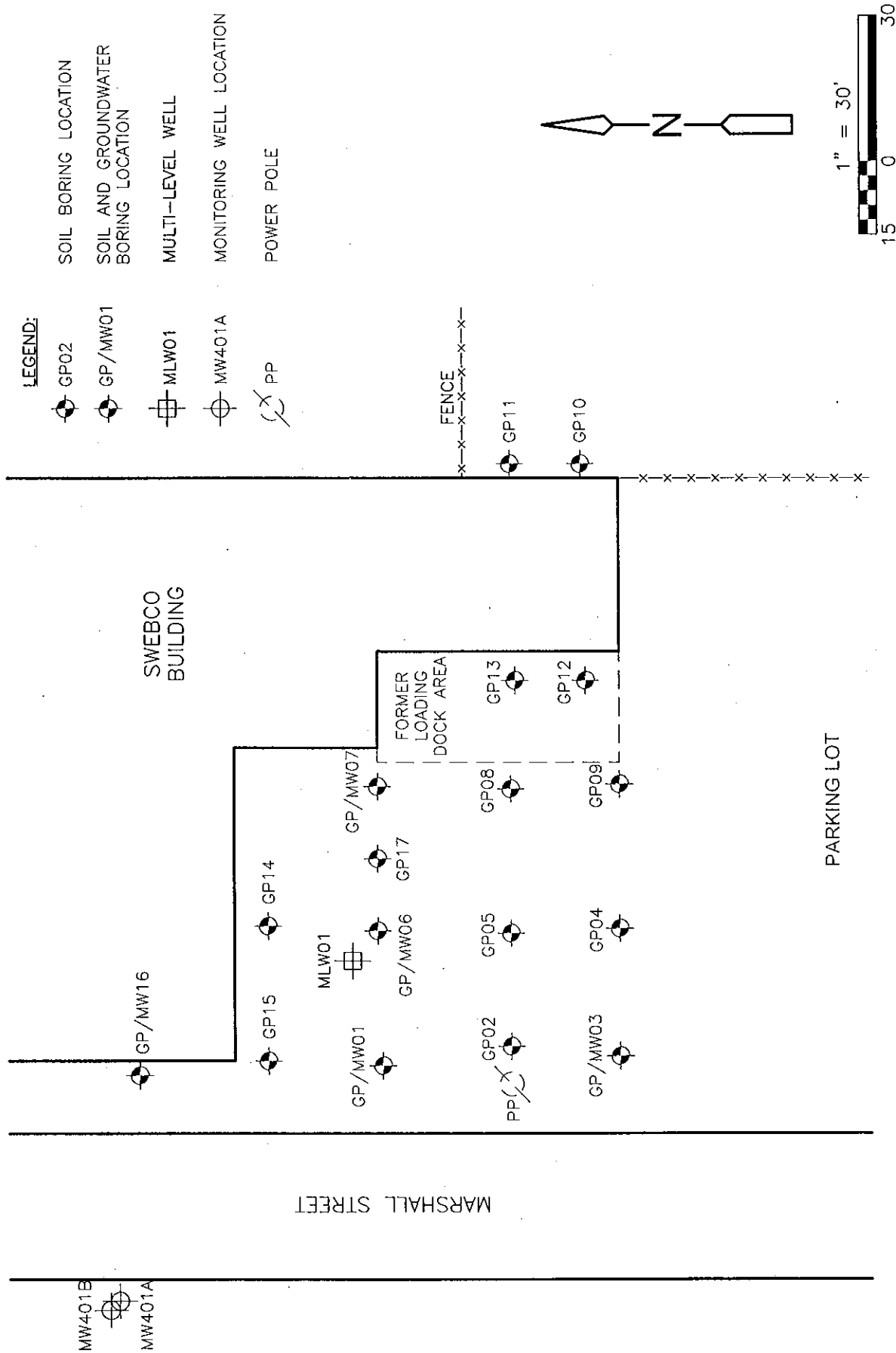


Figure 3
AREA 4 PHASE II PRE-DESIGN
SITE SAMPLING LOCATIONS



Figure 5
AREA 4 PHASE II PRE-DESIGN
TCA RESULTS IN SHALLOW GROUNDWATER

